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12/12/2005

Kinya Aota

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EXAMINER

STONER, KILEY SHAWN

ART UNIT

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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/560,225	Applicant(s) AOTA ET AL.	
	Examiner KILEY STONER	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 23-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-9, 24, 26, 29 and 32 is/are allowed.
- 6) ☒ Claim(s) 1, 4-6, 10, 12-17, 25, 27, 28, 30 and 31 is/are rejected.
- 7) ☒ Claim(s) 2, 3, 11, 18 and 23 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6, 13-14, 25, 28 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwashita (US 2001/0038028A1) in view of Heideman et al. (U.S. 6,053,391) (hereafter Heideman) or Mahoney (U.S. 6,543,670) or Waldron et al. (U.S. 6,908,690) (hereafter Waldron).

Iwashita teaches a friction stir welding method for a lap joint (Figures 5 and 6; and paragraphs [0047]-[0050]), in which a plurality of members are lapped and a welding tool is pressed into one of the members, while being rotated, to cause friction stir to achieve welding (Figures 5 and 6; and paragraphs [0047]-[0050]), characterized in that the method comprises using, as the welding tool, a welding tool having a small diameter projected part (#2) at a tip end of a shoulder (bottom surface of #1), and pressing the projected part and the shoulder of the welding tool into one of the members and not into a member, of the plurality of members, adjacent said one of the members (Figures 5 and 6; and paragraphs [0047]-[0050]).

Iwashita does not teach wherein at least two of the plurality of members are of different metals from each other.

Heideman, Mahoney and Waldron all teach friction stir welding dissimilar materials (note column 2, lines 50-54 of Heideman; column 1, lines 24-33 and column 3, lines 26-27 of Mahoney; and column 2, lines 19-27 and column 5, lines 13-28 of Waldron).

Since it is notoriously well known to friction stir weld dissimilar materials as taught by Heideman, Mahoney and Waldron, it is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to friction stir weld dissimilar materials when performing the process of Iwashita where the tip is only inserted into the top member being joined. Note that the plastic flow depicted in Figures 5-6 shows that the tip does not have to be inserted into at least two members to form a lap joint. One of ordinary skill in the art would be motivated to friction stir weld dissimilar materials in order to form an assembly of the desired materials that has the advantages of a friction stir welded joint. The claim would have been obvious because "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense." Additionally, the claim would have been obvious because a person of ordinary skill in the art would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success.

With respect to claim 6, it is the examiner's position that the process of Iwashita intrinsically meets the limitations of the welding tool is pressed into one of the members and a welding boundary surface is activated and welded by plastic flow, in which such pressing causes the one of the members to be discharged to an outer periphery of the welding tool.

With respect to claim 13, Iwashita teaches pressing the tool into only the one of the members to cause friction stir welding of the one of the members (Figures 5 and 6). The welding tool of Iwashita is intrinsically pulled out of the workpieces upon completion of the weld. It should be noted that claim 13 does not positively require a spot welding process. In addition, friction stir spot welding processes are well known.

With respect to claim 14, Iwashita teaches the welding tool is moved in a direction of welding in a state, in which the welding tool is pressed into the one of the members (Figure 5, 6 and 12).

With respect to claim 25, Iwashita teaches that the plurality of lapped members are face-to-face (Figures 5 and 6).

With respect to claim 28, Iwashita teaches said welding tool is pressed into said one of the members in a thickness direction thereof, and does not extend through an entirety of the thickness of said one of the members (Figures 5 and 6).

With respect to claim 31, it is the examiner's position that the process of Iwashita intrinsically meets the limitations of said welding tool is pressed into said one of the

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members, while being rotated, so as to remove surface oxide films on welding boundary surfaces of the one of the members and the member adjacent thereto.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwashita in view Heideman or Mahoney or Waldron as applied to claim 1 above, and further in view of Boon et al. (U.S. 6,325,273) (hereafter Boon).

Iwashita and Heideman or Mahoney or Waldron teach all of the limitations of the claim except that an outer peripheral surface of a tip end of the shoulder of the welding tool is inclined to define an inclined surface; and an outer peripheral surface of a tip end of the shoulder of the welding tool is rounded.

Boon teaches an outer peripheral surface of a tip end of the shoulder of the welding tool is inclined to define an inclined surface (Figures 3-5; and column 4, lines 53-64); and an outer peripheral surface of a tip end of the shoulder of the welding tool is rounded (Figures 3-5; and column 4, lines 53-64).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the inclined surface of Boon with the FSW processes of Iwashita and Heideman or Mahoney or Waldron in order to facilitate a slight undercut (note column 4, lines 53-64 of Boon).

Claims 10, 12, 15-17, 27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwashita (US 2001/0038028A1) in view of Mahoney.

Iwashita teaches a friction stir welding method for a lap joint (Figures 5 and 6; and paragraphs [0047]-[0050]), in which a plurality of members are lapped and a welding tool is pressed into one of the members, while being rotated, to cause friction stir to achieve welding (Figures 5 and 6; and paragraphs [0047]-[0050]); and the welding tool is pressed into only one of said plurality of members (Figures 5 and 6; and paragraphs [0047]-[0050]).

Iwashita does not teach that a tip end of the welding tool is flat and an outer peripheral surface thereof is rounded; and at least two of said plurality of members are of different metals from each other.

Mahoney teaches a tip end of the welding tool is flat and an outer peripheral surface thereof is rounded (Figures 3 and 5); and at least two of said plurality of members are of different metals from each other (column 1, lines 24-33 and column 3, lines 26-27).

Since it is notoriously well known to friction stir weld dissimilar materials as taught by Mahoney, it is the examiner's position that at the time of the invention it would have been obvious to one of ordinary skill in the art to friction stir weld dissimilar materials when performing the process of Iwashita where the tip is only inserted into the top member being joined. Note that the plastic flow depicted in Figures 5-6 shows that the tip does not have to be inserted into at least two members to form a lap joint. One of ordinary skill in the art would be motivated to friction stir weld dissimilar materials in order to form an assembly of the desired materials that has the advantages of a friction stir welded joint. The claim would have been obvious because "a person or ordinary

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skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.” Additionally, the claim would have been obvious because a person of ordinary skill in the art would have been motivated to combine the prior art to achieve the claimed invention and that there would have been a reasonable expectation of success.

With respect to claim 12, it is the examiner’s position that the process of Iwashita intrinsically meets the limitations of a welding interface is activated and welded by causing the one of the members to undergo plastic flow.

With respect to claims 15-16, Mahoney teaches that lapped surfaces of the plurality of members are coated with soft metal (Figures 4B; 5 and 6; and column 5, line 52-column 6, line 14); and wherein the soft metal is any one of nickel, zinc, and copper (column 5, line 52-column 6, line 14).

With respect to claim 17, the examiner takes Official Notice that providing a trapezoidal on a surface of the one of the members on that side, into which the welding tool is pressed, to prevent an indentation produced due to pressing of the welding tool is well known in the art. In fact, the named invention Kinya Aota has several prior art patents teaching the trapezoid member and the associated advantages.

With respect to claim 27, Iwashita teaches that the plurality of lapped members are face-to-face (Figures 5 and 6).

With respect to claim 30, Iwashita teaches said welding tool is pressed into said one of the members in a thickness direction thereof, and does not extend through an entirety of the thickness of said one of the members (Figures 5 and 6).

Allowable Subject Matter

Claims 2-3, 11 and 18, 23 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 7-9, 24, 26, 29 and 32 are allowed.

Response to Arguments

Applicant's arguments filed 4/10/08 have been fully considered but they are not persuasive.

The applicant's argument that the present invention is based on the removal of the surface oxide films for providing a good metallic weld, and that teachings of the applied references would have neither disclosed nor would have suggested the present invention is not commensurate in scope with the claims. Thus, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., removal of the surface oxide films) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into

the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Furthermore, the process described by Iwashita would inherently exhibit plastic flow that causes shearing stress on the welding boundary surface of the adjacent plates in the welding part, so that surface oxide films on the welding boundary surfaces are removed and both plates are mechanically welded.

The examiner maintains the position that Figure 5 of Iwashita clearly depicts the claimed process of "pressing the projected part and the shoulder of the welding tool into one of the members" and "wherein the welding tool is pressed into only said one of the member and not into a member, of the plurality of members, adjacent said one of the members". Figure 12 of Iwashita, which shows the FSW tool moving only through the top workpiece, also reinforces the examiner's position.

Figure 6 of Iwashita shows FSW wherein only the upper workpiece is penetrated by the tip of the friction stir welding tool. Even though Figure 6 of Iwashita does not show the shoulder of the FSW tool entering the upper workpiece, it is the examiner's position that the downward force required to join the two workpieces would be of such a magnitude that the shoulder would enter the upper workpiece to some degree.

Furthermore, the examiner disagrees with the applicant's interpretation of paragraph [0049] of Iwashita. In fact, it is the examiner's position that paragraph [0049] of Iwashita, which is reproduced in its entirety, actually reinforces the pending rejection.

"As shown in FIG. 6, pressing the rotary tool 1 rotating at predetermined speed of rotation substantially vertically on the first metal member W1 causes the friction between the rotary tool 1 and the first material W1 to soften the surface of the first material W1 so that the metal texture between the first and second materials W1, W2 are agitated in the nonmelting condition in a rotational direction. As the pressing force against

the first metal member W1 by the rotary tool 1 is increased, the second material W2 out of contact with the rotary tool 1 is started to be agitated together. At this time, the metal texture of the first and second materials W1, W2 are agitated in the rotational direction of the rotary tool 1 and also agitated in a direction of the thickness (in a direction perpendicular to the joining surface of the first and second materials W1 and W2) at the projection 2, and the superposed first and second materials W1 and W2 are finally joined without being melt".

The applicant also argues that since Iwashita teaches mixing of materials of the first and second materials of the members is a different technical idea from that of the present invention. In the broadest reasonable interpretation the teachings of Iwashita read on the applicant's claims. Furthermore, as discussed above, the applicant is not claiming what they consider throughout the response to be a different technical idea. The examiner also takes the position that the process described by Iwashita inherently results in at least one of the members undergoing plastic flow (note Figures 5 and 6; and paragraph [0049]); removing surface oxide films on the welding boundary surfaces of the members and the member adjacent thereto; and the welding tool is pressed while being rotated so as to cause plastic flow mainly in a direction in which the welding tool rotates.

Additionally, the applicant attempts to compare the mixing action described in Mahoney with the technical idea of the present invention of activating the welding interface by the removal of oxide. Once again, this argument is not commensurate in scope with the claims since the removal of oxide is not being claimed.

The applicant argues that one of ordinary skill in the art concerned with Iwashita would not have looked to the teachings of Waldron, et al., having the intermediate pin with first and second shoulders. The examiner disagrees because the claim would have

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been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art. Furthermore, the claim would have been obvious because "a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense."

The applicant argues that Boon et al. discloses that the protrusions of the tool fully penetrate the workpiece nearest the tool but only partially penetrate the other workpiece. Compare with the present invention, reciting that the welding tool is pressed into only the one of the members, and not into an adjacent member. It should be noted by the applicant that the rejection is based on Iwashita teaching that it is known to friction stir weld workpieces together by only penetrating one of the workpieces. The rejection is not based on Boon et al. teaching this concept. Boon et al. is solely relied upon by the examiner to establish that the claimed friction stir welding tool is known in the art. Likewise, the examiner maintains that the friction stir welding tool of claim 10 is met by the teachings of Mahoney.

Accordingly, the examiner maintains the position that a *prima facie* case of obviousness has been established by the teachings of the prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiley Stoner whose telephone number is 571-272-1183. The examiner can normally be reached Monday-Thursday (9:30 a.m. to 8:00 p.m.).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jessica Ward can be reached on 571-272-1223. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kiley Stoner/

Primary Examiner, Art Unit 1793